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28. An open top gravity flow liquid transport canal having a length providing a direction of flow and having therein an impermeable plastic liner providing first and second ends spaced apart along the length of the canal and first and second sides transverse to the first and second ends and at least three tabs between the liner and the canal extending in the direction of flow, and several series of fasteners extending from adjacent the first liner end to adjacent the second liner end and projecting through the tab having a head between the tab and the liner for anchoring the liner to the canal, at least one of the tabs being spaced from the sides of the liner before the installation of a fastener.

Remarks

The Official Office Action of January 28, 2002, and the references therein cited have been carefully considered. An English language translation of Japan 4-7499 has been obtained and is attached. Although applicant believes this translation is accurate and the translation was done by a professional translator, applicant cannot guarantee the translation.

Claim 14 was objected to as being dependent on a rejected claim. Claim 14 has been cancelled and replaced by independent claim 25 which should be allowable.

Claims 1-13 and 15-23 were rejected as unpatentable under 35 USC 103 over Japanese 62-29610 in view of Japanese 4-7499 based on the following rationale:

Japanese '610 discloses a canal including a plastic liner 1 fixed to the canal via fasteners 3, it is inherent that the canal has a length, a bottom and first and second side walls.

Japanese '610 does not disclose the at least one tab such that a head of a fastener is between the tab and the liner. Japanese '499 teaches that it is known to provide tabs (generally shown at 4a and 4b) on a water proof sheet 1 wherein the head of a fastener 10 is between the tab and the liner and the sheets are capable of being heat sealed ie. fusion welded as shown in figures 1-3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a tab on a waterproof sheet, as taught by Japanese '499 in order to facilitate fastening of a waterproof sheet and to ensure a "leak proof" connection. . . .

Applicant controverts this rejection as it may relate to the claims presently in the application.

Japanese '499 relates to the joining of waterproof sheets at the ends thereof rather than joining an intermediate portion of a sheet to its underlying support. The English language translation of '499 states, in the paragraph entitled Prior Art:

. . . it is difficult to attach another waterproof sheet so that it is sealed completely enough at the attachment points to prevent water infiltration at the attachments.

Japanese '610 is directed to the same problem. For example, the drawing shows two sheets of impermeable sheet being joined by

driving a plastic fastener through the overlapped sheets and then covering the joint with water proof tape.

In a way, Japanese patents '499 and '610 have the same solution, i.e. overlap the edges of two impermeable sheets and drive a fastener through the overlapped edges and then try to water proof the joint. All of this is done, of course, in the field where the conditions will invariably be too hot, too cold, too dusty, too muddy or too far from town inevitably leading to some leaks along the joint.

The problem of attaching waterproof sheets together is not the problem addressed by this invention. Indeed, this invention has the same problem as the prior art in providing a leak proof seal between adjacent impermeable sheets. Whereas Japanese '610 makes joints along the sides and ends of the impermeable sheets, applicant makes joints only one the ends as shown in Figures 5-6.

The problem addressed by this invention is securing intermediate sections of an impermeable sheet to open top gravity flow liquid transport canals. The goal is to provide a mechanical connection without driving a fastener through the impermeable sheet which inherently produces a potential leakage site. The Examiner will appreciate that driving a fastener every few feet along three lines of tabs extending along the length of a liner several thousand feet long would produce several thousands of potential

leakage sites, many of which would ultimately leak despite everything that could be done.

Applicant's liner is made up in a shop, plant or factory to be sufficiently wide to extend across the width of the canal so that any seams are shop made under reasonably controlled conditions which leads to many fewer leaks along the seam. Thus, in applicant's device, none of the fasteners that extend through the tabs puncture the impermeable membrane. In addition, at least some of the fasteners are located in a position where the membrane is continuous in all directions, i.e. not along the edges of the liner.

Claims 1, 17, 20, 26 and 28 claim this concept in somewhat different manners. Taking claim 20 first, claim 20 is a method claim and recites

providing a plastic liner having ends spaced along the length of the canal and sides providing a width wider than the canal and at least one tab on a first side of the liner intermediate the sides and ends of the liner; then

placing the liner in the canal so the first and second ends are spaced apart along the length of the canal and then placing the tab adjacent the canal;

then anchoring the liner to the canal including driving at least one fastener through the tab; and then placing the sides of the liner over a top of the sides of the canal.

It will be seen that Japanese '610 does it differently, i.e. a liner, narrower than the canal, is placed in the canal and the sides are joined to a second liner. It is accordingly submitted that claim 20 and its dependent claims 21-23 are allowable.

Claims 1, 17, 26 and 28 are apparatus claims and recite the concept in somewhat different manners. Claim 1 recites:

the liner being continuous at locations spaced from and 360° around at least some of the fasteners immediately before driving the fasteners through the tab and the liner being unpunctured immediately after driving the fasteners.

Claims 17 and 26 recite:

at least part of one of the tabs being in an area where the liner is continuous before a fastener is inserted through the tab.

Claim 28 recites:

at least one of the tabs being spaced from the sides of the liner before the installation of a fastener.

The tabs of Japanese '499 and '610 are, of course, at the edges of a sheet of the liner so a connection may be made to the next adjacent sheet. In this invention, all but a few tabs are located intermediate the ends of the liner to support the liner along the edge of the canal.

It is accordingly submitted that independent claims 1, 17, 26 and 28 and their dependent claims are allowable over the art of record.

A set of marked up claims and marked up specification paragraphs are attached. A set of formal drawings is attached.

It is accordingly submitted that this application is in condition for allowance and early steps toward that end are earnestly solicited.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "G. Turner Moller".

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paragraph beginning on page 5, line 11

Because many of such canals 10 have been in use for long periods, the concrete lining 24 has been cracked, usually by soil movement due to expansion and contraction of the underlying earth 12 due to wetting and drying of the soil. In some situations, very large percentages of water delivered to the canal system [is] are lost before it reaches its destination. Because only a small percentage of the lost water is due to evaporation, the vast bulk of shrinkage is from seepage through the concrete liner 24. This is not surprising because close inspection of concrete lined canals reveals that large cracks are common in some areas. If large water losses are common in concrete lined canals, it is easy to understand that even larger losses are sustained in earthen or unlined canals. There are a number of techniques to repair cracked concrete lined canals, none of which have heretofore had the desirable combination of low cost and being effective.

1. (Amended) An open top gravity flow liquid transport canal having a length providing a direction of flow and a width and having therein an impermeable plastic liner providing a continuous impermeable unpunctured membrane extending across the canal width and along a length of the canal for minimizing leakage from the canal and at least one tab between the liner and the canal and [means anchoring the liner to the canal including] a series of fasteners extending through the tab having a head between the tab and the liner, the liner being continuous at locations spaced from and 360° around at least some of the fasteners immediately before driving the fasteners through the tab and the liner being unpunctured immediately after driving the fasteners.

6. (Amended) The canal of claim 1 wherein the canal has a length, a bottom and first and second side walls and a first tab extends along the length of the canal adjacent the bottom, a second tab extends along the length of the canal adjacent the first side wall and a third tab extends along the length of the canal adjacent a second side wall and wherein the [anchoring means comprises] fasteners [extending] extend through each tab at spaced intervals along the length of the canal.

13. (Amended) The canal of claim 12 [wherein the anchoring means includes] further comprising an anchor extending into the earth [and means connecting], the fastener being secured to the anchor.

17. (Amended) An open top gravity flow liquid transport canal having a wall; an impermeable, imperforate plastic liner having a first side juxtaposed to the wall and a second side exposed to liquid in the canal; and a series of fasteners on the first side of the liner connecting the liner to the canal wall, at least a substantial number of the fasteners being in an area where the liner is continuous before a fastener is installed.

20. (Amended) The method of lining an open top gravity flow liquid transport canal having a length providing a direction of flow, comprising

providing a plastic liner having ends spaced along the length of the canal and sides providing a width wider than the canal and at least one tab [thereon] on a first side of the liner intermediate the sides and ends of the liner; then [;]

placing the liner in the canal so the first and second ends are spaced apart along the length of the canal and then placing the tab adjacent the canal; [and]

then anchoring the liner to the canal including driving at least one fastener through the tab; and then
placing the sides of the liner over a top of the sides of the
canal.